UNITED STATES PATENT AND TRADEMARK OFFICE

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2191	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/582,519	LI ET AL.
	Examiner	Art Unit
	QAMRUN NAHAR	2191

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>09 June 2006</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-28</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-28</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>09 June 2006</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☒ All   b)☐ Some *   c)☐ None of:
      1.☒ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>04/16/2008</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-28 have been examined.

Specification

The disclosure is objected to because of the following informalities: Field of the

Invention and Summary sections are missing on pg 1 of the specification.

Appropriate correction is required.

Claim Objections

.   Claim 22 is objected to because of the following informalities: a colon is missing at the

end of line 2 of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
requirements of this title.

Claims 22-28 are rejected under 35 U.S.C. 101 because the claimed invention is directed

to non-statutory subject matter.

Claim 22 reciting a "computer-readable medium", is not limited to tangible storage

devices in view of pg. 3, par. 0013, in the instant specification, which suggests that such a

medium may be a carrier wave or transmission medium (intangible). Accordingly, claim 22 does

not recite tangible manufactures, and are non-statutory subject matter.

As per claims 23-28, these claims are rejected for failing to cure the deficiencies of the

above rejected base claim 22.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang, et al.

"Impact: An Architectural Framework for Multiple-Instruction-Issue Processors", 1991

(hereinafter "Chang").

Per Claim 1:

The Chang publication discloses:

- extracting an asynchronous signal from a memory access instruction in a program to represent a

latency of the memory access instruction ("… inline expansion …" on pg. 268, e.g. see section

2.3)

- and generating a wait instruction to wait for the asynchronous signal ("… Prepass code

scheduling is performed prior to register allocation …" on pg. 268, e.g. see section 2.4).

Per Claim 2:

The Chang publication discloses:

- further comprising: enforcing a first dependence between the memory access Instruction and the wait instruction via the asynchronous signal (e.g. on pg. 268, see section 2.5).

Per Claim 3:

The Chang publication discloses:

- further comprising: introducing a pseudo signal to enforce a second dependence between the wait instruction and a memory access dependent Instruction (e.g. on pg. 268, see section 2.3).

Per Claim 4:

The Chang publication discloses:

- further comprising: making the memory access instruction define the asynchronous signal; and making the wait instruction use the asynchronous signal (on pg. 268, e.g. see section 2.4).

Per Claim 5:

The Chang publication discloses:

- further comprising: making the wait instruction define a pseudo signal; and making an instruction that depends on the completion of the memory access instruction use the pseudo signal (e.g. on pg. 268, see section 2.3).

Per Claim 6:

The Chang publication discloses:

- further comprising: storing the asynchronous signal in a signal register of a network device (pg. 267, see the par. right before section 2.1).

Per Claim 7:

The Chang publication discloses:

- storing the pseudo signal in a pseudo signal register of a network device (pg. 267, see the par. right before section 2.1 and on pg. 268, see section 2.3).

Per Claim 8:

The Chang publication discloses:

- performing a first code motion on a first set of one or more instructions except each memory access instruction in the program ("… inline expansion …" on pg. 268, e.g. see section 2.3)

- and performing a second code motion on a second set of one or more instructions except each wait instruction in the program, to increase a number of instructions between issue and completion of the memory access instruction ("… Prepass code scheduling is performed prior to register allocation …" on pg. 268, e.g. see section 2.4).

Per Claim 9:

The Chang publication discloses:

- wherein the first code motion comprises moving the first instruction set forward through one or more paths of the program with the memory access instructions fixed, and the second code motion comprises moving the second instruction set backward through the one or more paths of the program with the wait Instructions fixed (e.g. on pg. 268, see section 2.3).

Per Claim 10:

The Chang publication discloses:

- wherein the first code motion comprises sinking the one or more instructions in the first set that occur in each predecessor block of a successor block into the successor block, and the second code motion comprises hoisting the one or more Instructions in the second set (e.g. on pg. 268, see section 2.3).

Per Claim 11:

The Chang publication discloses:

- performing a speculative code motion on a wait instruction, in response to determining that the

wait instruction is absent in at least one predecessor blocks of a successor block (on pg. 268, see

section 2.5).

Per Claim 12:

The Chang publication discloses:

- in response to determining that the number of occurrence of a wait instruction in predecessor

blocks of a successor block is less than the number of the predecessor blocks, appending a

compensation code for the wait instruction to one or more predecessors that lack the wait

instruction; removing the wait instruction from the predecessors; and prepending an instruction

instance of the wait instruction to the successor block (on pg. 268, see section 2.4 and 2.5).

Per Claim 13:

The Chang publication discloses:

- a code motion unit to perform code motion in a program subject to a dependence constraint of

the program to hide a latency of a memory access instruction in the program (on pg. 268, e.g. see

section 2.4).

Per Claim 14:

The Chang publication discloses:

- further comprising: an intermediate language unit to represent a memory access instruction in a program with an asynchronous signal associated with a latency of the memory access instruction (on pg. 268, e.g. see section 2.4).

Per Claim 15:

The Chang publication discloses:

- further comprising: an intermediate language unit to represent a memory access instruction in a program with an asynchronous signal associated with a latency of the memory access instruction (on pg. 268, e.g. see section 2.4).

Per Claim 16:

The Chang publication discloses:

- further comprising: an intermediate language unit to define a pseudo signal in a wait instruction associated with the memory access instruction and to make an instruction that depends on the memory access instruction use the pseudo signal (on pg. 268, e.g. see sections 2.3 and 2.4).

Per Claim 17:

The Chang publication discloses:

- wherein the code motion unit further to move a wait instruction associated with the memory

access instruction and a first set of one or more instructions in a first direction subject to the

dependent constraint, with the memory access instruction fixed; and move the memory access

instruction and a second set of one or more instructions in the program subject to the dependent

constraint in a second direction that is opposite to the first direction, with the wait instruction

fixed (on pg. 268, e.g. see sections 2.4 and 2.5).

Per Claim 18:

The Chang publication discloses:

- wherein the code motion unit further to sink a wait instruction associated with the memory

access instruction and a first set of one or more instructions of the program from each

predecessor block to a successor block at a merging point of the predecessor blocks subject to the

dependence constraint of the program, in response to determining that each predecessor block

comprises the wait Instruction and the one or more instructions, with the memory access

instruction fixed; and hoist the memory access instruction and a second set of one or more

instructions in the program subject to the dependent constraint, with the wait instruction fixed

(on pg. 268, e.g. see sections 2.3 and 2.4).

Per Claim 19:

The Chang publication discloses:

- wherein the code motion unit further to perform a speculative code motion on a wait instruction

associated with the memory access instruction, in response to determining that the wait

instruction is present in a first predecessor block of a merging successor block of the program

and is absent in a second predecessor block of the merging successor block (on pg. 268, see

section 2.4 and 2.5).

Per Claim 20:

        The Chang publication discloses:

- wherein the code motion unit further to recognize a wait instruction associated with the

memory access instruction as a motion candidate subject to a dependence constraint of the

program; in response to determining that the wait instruction is present in a first predecessor

block of the merging successor block and is absent in a second predecessor block of the merging

successor block, insert a compensation code for the wait instruction into the second predecessor

block; and sink the wait instruction into a merging successor block of the first and second

predecessor blocks subject to the dependence constraint (on pg. 268, see section 2.4 and 2.5).

Per Claim 21:

        The Chang publication discloses:

- wherein the code motion unit further to hoist the memory access instruction subject to the

dependence constraint (pg. 268, e.g. see section 2.4).

Per Claims 22-23:

These machine readable medium versions of the claimed method discussed above (claims 8 and 12, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Chang.

Per Claim 24:

The Chang publication discloses:

- wherein the machine readable medium further comprising instructions that in response to being executed result in the computing device appending a wait instruction corresponding to the candidate to each of said one or more predecessor blocks where the candidate is absent (pg. 268, e.g. see section 2.4).

Per Claim 25:

The Chang publication discloses:

- wherein the machine readable medium further comprising instructions that in response to being executed result in the computing device sinking each wait Instruction corresponding to the candidate in each predecessor blocks of the first block into the first block (on pg. 268, see section 2.4 and 2.5).

Per Claim 26:

The Chang publication discloses:

- wherein the machine readable medium further comprising instructions that in response to being executed result in the computing device in response to determining that a number of occurrence of the candidate in the predecessor blocks equals to a number of the predecessor blocks, removing each instruction corresponding to the candidate from each predecessor block of the first block; and prepending an instruction instance of the candidate to the first block (on pg. 268, see section 2.4 and 2.5).

Per Claim 27:

The Chang publication discloses:

- wherein the machine readable medium further comprising instructions that in response to being executed result in the computing device updating a dependent constraint of predecessor blocks of the first block (pg. 268, e.g. see section 2.4).

Per Claim 28:

The Chang publication discloses:

- wherein the machine readable medium further comprising instructions that in response to being executed result in the computing device determining a sinking candidate from one or more

instructions of the program except the memory access instruction, based on a dependence

constraint of the program; performing a code sinking on each Instruction corresponding to the

sinking candidate subject to the dependence constraint; determining a hoisting candidate from

one or more instructions of the program except a wait Instruction associated with the memory

access instruction, based on the dependence constraint of the program; and performing a code

hoisting on each instruction corresponding to the hoisting candidate subject to the dependence

constraint (pg. 268, e.g. see sections 2.4 and 2.5).

Conclusion

Any inquiry concerning this communication from the examiner should be directed to

Qamrun Nahar whose telephone number is (571) 272-3730. The examiner can normally be

reached on Mondays through Fridays from 10:00 AM to 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Wei Y Zhen, can be reached on (571) 272-3708. The fax phone number for the

organization where this application or processing is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the TC 2100 Group receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Art Unit 2191